(2) For a vessel receiving alterations, a cable may be spliced to extend a circuit;

(3) A cable having a large size or exceptional length may be spliced to facilitate its installation; and

(4) A cable may be spliced to replace a damaged section of the cable if, before replacing the damaged section, the insulation resistance of the remainder of the cable is measured, and it is determined that the condition of the insulation is unimpaired.

(n) All material in a cable splice must be chemically compatible with all other material in the splice and with the materials in the cable.

(o) Ampacities of wires must meet Section 310–15 of the NEC (NFPA 70), or other standard specified by the Commandant. Ampacities of cables must meet table A6 of Institute of Electrical and Electronic Engineers (IEEE) Standard 45, ''Recommended Practice for Electrical Installations on Shipboard,'' or other standard specified by the Commandant. Ampacities for Navy cable must meet NAVSEA Design Data Sheet (DDS) 304–2 ''Electrical Cable, Ratings and Characteristics'' as appropriate.

(p) Conductors must be sized so that the voltage drop at the load terminals does not exceed 10 percent. Table 120.3340(p) indicates the size of conductor required for corresponding lengths and steady state (stable) values to obtain not more than this voltage drop at the load terminals of a two conductor circuit.

TABLE 120.340(p)—CONDUCTOR SIZES FOR AMPERES—LENGTHS

Total current on circuit, amperes	Length of conductor in meters (feet) from source of current to most distant fixture										
	3.1 (10)	4.5 (15)	6.1 (20)	7.6 (25)	9.2 (30)	10.7 (35)	12.2 (40)	13.7 (45)	15.2 (50)	16.8 (55)	18.3 (60)
12 volts, 2-wire—10 percent drop wire sizes (A.W.G.)											
5	14	14	14	14	14	14	14	14	12	12	12
14	14	14	14	12	12	12	10	10	10	10	8
15	14	14	12	10	10	10	8	8	8	8	8
20	12	12	10	10	8	8	8	8	6	6	6
25	10	10	10	8	8	8	6	6	6	6	4

Other values can be computed by means of the following formula:

$$cm = \frac{K \times I \times L (\times 2 \text{ for two-wire circuit})}{E}$$

Where:

cm = Circular-mil area of conductor.
K = 3.28 ohms/mil-meter (metric)
K = 10.75 ohms/mil-foot (english)
(a constant representing the resistance of cooper).
I = Load current, in amperes.
L = length of conductor from center of distribution, in meters (feet).
E = Voltage drop at load, in volts.

(q) If used, each armored cable metallic covering must:

(1) Be electrically continuous; and

(2) Be grounded at each end of the run to:

(i) The metallic hull; or

(ii) The common ground plate on nonmetallic vessels; and

(3) Have final sub-circuits grounded at the supply end only.

(r) A portable or temporary electric cord or cable must be constructed and used in compliance with the requirements of §111.60–13 in subchapter J of this chapter for a flexible electric cord or cable.

[CGD 85–080, 61 FR 928, Jan. 10, 1996; 61 FR 20556, May 7, 1996, as amended at 62 FR 51352, Sept. 30, 1997]

§ 120.350 Batteries—general.

(a) Where provisions are made for charging batteries, there must be natural or induced ventilation sufficient to dissipate the gases generated.

(b) Each battery must be located as high above the bilge as practicable, secured to protect against shifting with the roll and pitch of the vessel, and free from exposure to water splash or spray.

(c) Batteries must be accessible for maintenance and removal.

(d) Connections must be made to battery terminals with permanent type

connectors. Spring clips or other temporary type clamps are prohibited.

(e) Batteries must be mounted in trays lined with, or constructed of, a material that is resistant to damage by the electrolyte.

(f) Battery chargers must have an ammeter connected in the charging circuit.

(g) If the batteries are not adjacent to a distribution panel or switchboard that distributes power to the lighting, motor, and appliance circuits, the battery lead must have a fuse in series, located as close as practicable to the battery.

(h) Batteries used for engine starting are to be located as close as possible to the engine or engines served.

§ 120.352 Battery categories.

This section applies to batteries installed to meet the requirements of § 120.310 of this part for secondary sources of power to vital loads, or sources of power to final emergency loads.

(a) *Large.* A large battery installation is one connected to a battery charger having an output of more than 2 kilowatts (kw), computed from the highest possible charging current and the rated voltage of the battery installation.

(b) *Small.* A small battery installation is one connected to a battery charger having an output of 2 kw or less, computed as above.

§ 120.354 Battery installations.

(a) *Large batteries.* Each large battery installation must be located in a locker, room or enclosed box solely dedicated to the storage of batteries. Ventilation must be provided in accordance with § 111.15–10 in subchapter J of this chapter. Electrical equipment located within the battery enclosure must be approved by an independent laboratory for Class I, Division 1, Group B hazardous locations and meet § 111.105 in subchapter J of this chapter.

(b) *Small batteries.* Each small battery installation must be located in a well ventilated space and protected from falling objects. A small battery installation must not be in a closet, storeroom, or similar space.

§ 120.360 Semiconductor rectifier systems.

(a) Each semiconductor rectifier system must have an adequate heat removal system that prevents overheating.

(b) Where a semiconductor rectifier system is used in a propulsion system or in other vital systems it must:

(1) Have a current limiting circuit;

(2) Have external overcurrent protection; and

(3) Meet Sections 35.84.2 and 35.84.4 of the American Bureau of Shipping (ABS), ''Rules for Building and Classing Steel Vessels,'' or other standard specified by the Commandant.

§ 120.370 General grounding requirements.

(a) A vessel's hull must not carry current as a conductor except for the following systems:

(1) Impressed current cathodic protection systems; or

(2) Battery systems for engine starting.

(b) Receptacle outlets and attachment plugs for portable lamps, tools, and similar apparatus operating at 100 volts or more, must have a grounding pole and a grounding conductor in the portable cord.

(c) Each nonmetallic mast and top mast must have a lightning ground conductor.

§ 120.372 Equipment and conductor grounding.

(a) All metallic enclosures and frames of electrical equipment must be permanently grounded to the hull on a metallic vessel. On a nonmetallic vessel, the enclosures and frames of electrical equipment must be bonded together to a common ground by a normally non-current carrying conductor. Metallic cases of instruments and secondary windings of instrument transformers must be grounded.

(b) On a nonmetallic vessel, where a ground plate is provided for radio equipment, it must be connected to the common ground.

(c) Equipment grounding conductors must be sized in accordance with Section 250–95 of the NEC (NFPA 70), or other standard specified by the Commandant.